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WRAPPED FILM GLASS ETC.

# PATENT SPECIFICATION

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750.906

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## COMPLETE SPECIFICATION

### Means and Process for Sealing Joints and Apertures

We, E. M. CROMWELL & COMPANY LIMITED, of Galloway Road, Rye Street, Bishop's Stortford, Hertfordshire, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention consists in means for sealing joints and apertures, especially burst water pipes and joints in submarine or subterranean pipes, comprising a tough woven fabric, preferably in the form of a tape, or glass fibre mat, or rovings impregnated with an organic peroxide, and in a dry state. The fabric used is preferably woven glass, although other material such as nylon can be used. The peroxide (which expression includes hydroperoxides) may, for example, be benzoyl peroxide or 1-hydroxy cyclohexyl hydroperoxide-1; it may be applied to the fabric in solution in a volatile organic solvent, suitably of a concentration in the range 10—25% by weight.

25 In use, in the case of tape, this is wound tightly over the joint or aperture, secured at least temporarily in position by some convenient means such as a piece of pressure-sensitive tape, and then impregnated, suitably by brushing with a non-air-inhibited unsaturated alkyd resin mixture which will set in the presence of the peroxide. The mixture may, if desired, be of the styrenated unsaturated alkyd type. Preferably it is one which will set at room temperature, although the application of infra red or other heating is not precluded.

40 The invention also consists in a method of sealing joints and apertures, especially burst water pipes and joints in submarine or subterranean pipes, in which the joint or apertured article is wrapped round with a band of woven fabric, especially glass or nylon fabric, pre-impregnated with an organic peroxide, and then impregnated, suitably by brushing, with a non-air-inhibited unsaturated alkyd resin mixture as described above.

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The expression "non-air inhibited" means not subject to inhibition of cure by atmospheric oxygen. Such inhibition is described in Patent No. 713332.

If the pipe is dirty or has ragged edges or an uneven contour, an improvement may be obtained by winding a layer of a suitable plastic sheeting as an underlay to the impregnated fabric. One suitable plastic is the copolymer sold under the trade name Velbex (R.T.M.) and is available as tape. The resin mixture is preferably applied to this underlay and to the adjacent exposed portions of pipe before winding on the impregnated fabric.

In a typical example, 150 grams of 1-hydroxy cyclohexyl hydroperoxide-1 are dissolved in 1 litre of acetone. A 50 yard reel of standard Marglass (R.T.M.) woven glass tape 2" wide, 0.007" thick, is totally submerged in the solution and left until no more air is expressed. Then the reel is removed, and placed on the bobbin of a warm air drying machine which blows warm air over the tape as it is fed over staggered pulleys to a winding bobbin where the dried tape is wound.

Instead of the peroxide mentioned, others such as benzoyl peroxide and lauryl peroxide may be used. As solvents, any inert volatile solvent such as methyl ethyl ketone, methyl isobutyl ketone, diacetone alcohol, carbon tetrachloride and trichlorethylene could be employed. The impregnation of glass cloth, mat and rovings may be effected in essentially the same way.

Resins suitable for use in conjunction with the impregnated tape are commercially available. Amongst these may be mentioned unsaturated polyester (i.e. unsaturated alkyd) Beetle (R.T.M.) resin 4128, which is styrenated and non-air inhibited, to which, immediately before use, is added 60 ml. of a 6% w/w cobalt naphthenate solution in white spirit for each 1000 grams of resin. Also suitable are Bakelite (R.T.M.) styrenated unsaturated polyester resin No. 17449, which is non-air-inhibited, and Marco (R.T.M.) styrenated unsaturated polyester resin 28C,

which is non-air-inhibited, each kilogram of which is treated with 40 ml. of the respective catalyst, Q17447 or Accelerator E, being in each case a solution of cobalt naphthenate in styrene.

In use, several windings are generally laid over the pipe, or underlay, each being painted with resin before the application of the next. Thus, in the case of a 4" diameter pipe, using three windings of tape with a 50% overlap of adjacent turns, 10 yards of tape as described above will cover a 10" length of pipe and require about 3—4 oz. of resin. The setting time of the resin is generally about  $\frac{1}{2}$  hour although some 2 hours should be allowed for hardening before admitting pressure fluid to the pipe unless a much thicker layer of fabric is applied.

Although the method hereinbefore described of winding impregnated tape round a pipe before application of resin, is believed to be the best, other methods of applying the impregnated fabric are not precluded. For example, a pad of impregnated glass fibre mat previously soaked in resin, could be applied to a hole in a pipe.

The Beetle resin 4128 referred to above is a solution in styrene of an unsaturated polyester resin, being a reaction product of a glycol with an alpha beta unsaturated dicarboxylic acid and a saturated dicarboxylic acid, containing an agent to prevent air inhibition. The Bakelite resin SR 17449 is likewise a solution in styrene of an unsaturated polyester resin containing an agent to prevent air inhibition, as is Marco resin 28 C.

What we claim is:—

1. Means for sealing joints and apertures, especially burst water pipes and joints in submarine or subterranean pipes, comprising a tough woven fabric, preferably in the form of a tape, or glass fibre mat or roving, impregnated with an organic peroxide, and in a dry state.

2. Means as set forth in Claim 1, in which the fabric is glass.

3. Means as set forth in Claim 1 or 2, in which the peroxide is 1-hydroxy cyclohexyl hydroperoxide-1 or benzoyl peroxide.

4. Means as set forth in Claim 1, 2 or 3 in which the peroxide is impregnated into the fabric by application as a solution in a volatile organic solvent, preferably at a concentration of 10—25%, the solvent then being evaporated.

5. A method of sealing joints and apertures, especially burst water pipes and joints in submarine or subterranean pipes, in which the joint or apertured article is wrapped round with a band of woven fabric, especially glass or nylon fabric, pre-impregnated with an organic peroxide, and then impregnated, suitably by brushing, with a non-air-inhibited unsaturated alkyd resin mixture which will set in the presence of the peroxide.

6. Means as set forth in Claim 1, substantially as described in the foregoing example.

7. A method of sealing bursts and joints in pipes, substantially as described in the foregoing example.

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## PROVISIONAL SPECIFICATION

### Means and Process for Sealing Joints and Apertures

We, E. M. CROMWELL & COMPANY LIMITED, of Galloway Road, Rye Street, Bishop's Stortford, Hertfordshire, a British Company, do hereby declare this invention to be described in the following statement:—

This invention consists in means for sealing joints and apertures, especially burst water pipes and joints in submarine or subterranean pipes, comprising a tough woven fabric, preferably in the form of a tape, impregnated with an organic peroxide. The fabric used is preferably woven glass, although other material such as nylon can be used. The peroxide (which expression includes hydroperoxides) may, for example, be benzoyl peroxide or 1-hydroxy cyclohexyl hydroperoxide-1; it may be applied to the fabric in solution in a volatile organic solvent, suitably of a concentration in the range 10—25%.

In use, the tape is wound tightly over the joint or aperture, secured at least temporarily

in position by some convenient means such as a piece of pressure-sensitive tape, and then impregnated, suitably by brushing with a non-air-inhibited unsaturated alkyd resin mixture which will set in the presence of the catalyst. The mixture may, if desired, be of the Laminac type, containing styrene. Preferably it is one which will set at room temperature, although the application of infra red or other heating is not precluded.

The invention also consists in a method of sealing joints and apertures, especially burst water pipes and joints in submarine or subterranean pipes, in which the joint or apertured article is wrapped round with a band of woven fabric, especially glass or nylon fabric, pre-impregnated with an organic peroxide, and then impregnated, suitably by brushing, with a non-air-inhibited unsaturated alkyd resin mixture as described above.

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# PATENT SPECIFICATION

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Inventor:—FREDERICK JAMES FOLKARD.



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## COMPLETE SPECIFICATION.

### Improvements in or relating to Couplings for Pipes and Pipe Fittings.

5 We, J. S. & F. FOLKARD LIMITED, a British Company, of Rectory Lane, Edgware, Middlesex, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The invention relates to couplings for pipes and pipe fittings such as elbows, bends, T pieces and the like, the pipes and fittings being of the kind which are made of plastic material such as polythene and are, for example, adapted to be employed in  
15 water or other liquid or fluid circulation or supply systems.

It is the chief object of the invention to evolve a method of and means for effecting satisfactory connections between such pipes  
20 and pipe fittings.

According to the invention there is provided a coupling between two plastic pipes or between a plastic pipe and a plastic pipe fitting wherein a spigot formed at the end  
25 of one coupled member is entered into a socket formed at the end of the other coupled member to bring the front faces of radial flanges provided around the respective members into abutting contact, the rear  
30 or remote faces of said flanges being undercut or recessed to receive rigid annular supports which are axially pressed towards one another and into the rear flange recesses, to maintain said abutting contact, by the inter-  
35 action of connecting collars surrounding the coupled members, said supports also serving to prevent radial collapse of the coupled members at the joint.

40 According to a further aspect of the invention a method of effecting a union or connection between two plastic pipes or a plastic pipe and a plastic fitting consists in providing one of the members to be con-

nected with a radial flange which projects beyond the adjoining member end to form  
45 a socket and providing the other of the members with a radial flange which is inset from the adjoining member end to form a spigot, the rear face of each said flange being recessed or undercut, and subsequently  
50 mating said spigot and socket to bring the forward faces of the two flanges into abutting relationship and applying a compressive force to said flanges by means engaging the recessed or undercut rear faces thereof.  
55

In order that the said invention may be clearly understood and readily carried into effect, the same will be hereinafter more fully described with reference to the accompanying drawing which shows in section a  
60 connection between two pipes.

Referring now to the drawings, 10 denotes an externally threaded metal collar which is loosely located on a pipe 11. The pipe 11 which is formed of plastic material such as  
65 polythene is provided with a radially outwardly directed flange 12, the outer or forward face of which is so formed as to provide a flat annular sealing surface. The inner or rear face of the flange 12 is recessed  
70 or undercut so as to accommodate a rigid annular support in the form of a metal ring 13, the forward end of the metal collar 10 being so formed that it will, on tightening of the connection as hereinafter described, abut against the ring 13 and cause the latter  
75 to fit snugly in the recessed or undercut surface of said flange 12.

As will be apparent from the drawing the metal collar 10 constitutes the male member  
80 of the coupling or connection, the female member comprising an internally threaded collar 14, having an inwardly directed rim around the rear end which allows passage therethrough of a second pipe 15 which is  
85 to be connected to the pipe 11 and is also

formed of a plastic material such as polythene. The pipe 15 is formed with a radially directed flange 16 similar to the flange 12 on the pipe 11, the rear face of said flange 16 being recessed or undercut to receive a rigid annular support in the form of a metal ring 17. In the embodiment illustrated in the drawing the pipe 15 is formed with a spigot portion such as 18 adapted to engage in a corresponding socket formed in the end of the pipe 11.

In order to effect the coupling or connection between the two pipes 11 and 15, the latter are disposed in axial alignment and the flanges 12 and 16 are brought into abutting relationship, the outer threaded collar 14 being thereafter engaged with the inner threaded collar 10. On tightening of the cap 14, the rings 13 and 17 will be pressed towards one another and into the recessed or undercut surfaces of the flanges 12 and 16 and the latter will be clamped tightly together. Due to the recessing or undercutting of the faces of said flanges and to the engagement therein of the respective rings 13 and 17, the ends of the pipes will be positively supported against radial collapse at the joint.

In certain cases it may be feasible to dispense with the ring 13 and so to chamfer the forward edge of the collar 10 that it will fit snugly into the recessed or undercut face of the flange 12 to constitute the rigid annular support therefor.

While the invention has been described above with reference to the connection or coupling of two pipes, it will be appreciated that a similar coupling may be employed to connect a plastic pipe to a plastic pipe fitting such as a bend, elbow or T junction. In such a case the metal collar 10 will be located at that end of the fitting to which the pipe is to be connected, said collar being incorporated into the fitting during the moulding thereof so that it is to all intents and purposes integral therewith. In such a case also a flange equivalent to the flange 12 would be provided at the end of the fitting.

What we claim is:—

1. A coupling between two plastic pipes or between a plastic pipe and a plastic pipe fitting wherein a spigot formed at the end of one coupled member is entered into a socket formed at the end of the other coupled member to bring the front faces of radial flanges provided around the respective

members into abutting contact, the rear or remote faces of said flanges being undercut or recessed to receive rigid annular supports which are axially pressed towards one another and into the rear flange recesses, to maintain said abutting contact, by the interaction of connecting collars surrounding the coupled members, said supports also serving to prevent radial collapse of the coupled members at the joint.

2. A coupling as claimed in Claim 1 wherein the connecting collars comprise an externally threaded collar located on one of the pipe or fitting members and an internally threaded collar, having an inwardly directed rim around one end, mounted on the other member, said collars being screwed together to apply the axial pressure.

3. A coupling as claimed in Claim 2, wherein the annular supports comprise separate metal rings which are adapted to be engaged respectively by the forward end of the inner collar and the inner surface of the outer collar rim.

4. A coupling as claimed in Claim 2, in which the inner collar is formed with a chamfered inner end adapted to constitute one of the annular supports.

5. A method of effecting a union or connection between two plastic pipes or a plastic pipe and a plastic fitting, such method consisting in providing one of the members to be connected with a radial flange which projects beyond the adjoining member end to form a socket and providing the other of the members with a radial flange which is inset from the adjoining member end to form a spigot, the rear face of each said flange being recessed or undercut, and subsequently mating said spigot and socket to bring the forward face of the two flanges into abutting relationship and applying a compressive force to said flanges by means engaging the recessed or undercut rear faces thereof.

6. A method of effecting a union or connection between two plastic pipes or a plastic pipe and a plastic fitting substantially as hereinbefore described.

7. A coupling between two plastic pipes or between a plastic pipe and a plastic pipe fitting substantially as hereinbefore described with reference to the accompanying drawing.

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#### PROVISIONAL SPECIFICATION.

#### Improvements in or relating to Couplings for Pipes and Pipe Fittings.

110 We, J. S. & F. FOLKARD LIMITED, a British Company, of Rectory Lane, Edgware, Middlesex, do hereby declare this

invention to be described in the following statement:—

This invention relates to pipes and pipe 115

5 fittings such as elbows, bends, T pieces and the like which are made of plastic material such as polythene and are for example adapted to be employed in water or other liquid or fluid circulation or supply systems.

It is the chief object of the invention to evolve a method of and means for effecting satisfactory connections between such pipes and pipe fittings.

10 According to the invention the respective ends of two pipes or of a pipe and a pipe fitting, which are to be interconnected are provided with corresponding radially outwardly directed flanges adapted to be brought into abutting relationship and means are provided whereby a compressive action may be exerted on the flanges thereby to clamp the same tightly together and at the same time to support and to prevent collapse of either or both of the abutting end portions of the pipes or of the pipe and fitting. Preferably the flanges at the abutting ends of the pipes or of the pipe and fitting are formed with recessed or undercut rear faces and the compression exerting means incorporate members adapted to engage in the recesses or undercut portions of such faces.

According to a further aspect of the invention a method of affecting a union or connection between two plastic pipes or a plastic pipe and a plastic fitting consists in flanging those ends of the pipes or of the pipe and pipe fitting so as to provide on each part a radially outwardly directed flange the rear face of which is recessed or undercut and subsequently bringing the forward faces of the two flanges into abutting relationship and applying a compressive force to said flanges by means engaging the recessed or undercut rear faces thereof.

In order that the nature of the invention may be more readily understood one embodiment thereof will now be indicated in greater detail.

45 In the following description, it will be assumed that it is desired to effect a junction between a pipe and a fitting, such as a bend, elbow or T junction, the pipe and the fitting being formed of a plastic material such as polythene. In such a case that end portion of the fitting to which the pipe is to be connected is provided with an external metal collar which is conveniently incorporated into the fitting during the moulding thereof so that it is to all intents and purposes integral therewith. The metal collar, which is externally screw threaded, is spaced slightly from the end of the fitting which latter is formed with a radially outwardly directed flange. The outer or forward face

of the flange is such as to provide a flat annular sealing surface around the end of the fitting but the inner or rear face of the flange is recessed or undercut, the forward end of the metal collar being correspondingly chamfered or so shaped that it will abut and fit snugly against the recessed or undercut face of said flange. The metal collar carried by the fitting is adapted to constitute the male member of a union or coupling, the female member of which comprises an internally threaded cap, the base of which is apertured to allow passage therethrough of the pipe which is to be connected to the fitting.

75 In order to effect the connection between the pipe and the fitting the internally threaded cap is located on the pipe together with a loose ring and the end of the pipe is flanged over to provide thereon a radially outwardly directed flange similar to that at the end of the fitting i.e. the outer or forward face of the pipe flange is formed to provide a flat annular sealing surface which will seat flush against and coincide with the outer or forward face of the flange on the fitting while the rear face of said pipe flange is formed with a recessed or undercut surface. The loose ring which is so dimensioned that it will be accommodated in the internally threaded cap is so formed that on being brought adjacent to the rear face of the pipe flange it will abut and fit snugly against the recessed or undercut surface thereof. With the respective outer or forward faces of the pipe and fitting flanges brought into abutting relationship and into coincidence the threaded cap is engaged with the threaded metal collar and is tightened up thereon. On such tightening of the threaded cap the loose ring will be forced tightly against the rear face of the pipe flange and the two flanges will be clamped tightly together by virtue of the action of the ring and the forward end of the metal collar against the rear faces of their respective flanges.

Due to the shape of the rear faces of the respective flanges and to the corresponding shapes of the forward end of the metal collar and of the ring the ends of the fitting and the pipe will be positively supported against collapse by the compression assemblies.

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